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Optimized Big Bore Gas Wells for Qatar North Field

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Abstract

An extensive big bore gas well drilling and completions program has been in progress since 2002 to develop the giant North Field, Offshore Qatar. This is the world's largest non-associated gas field and contains approximately 900 Tcf of abnormally pressured natural gas producing from thick, Khuff carbonate reservoirs.

This is the widest known application of big bore wells in a single field, involving up to 80 wells. Currently, over 60 of these wells are drilled and completed and are among the world's most prolific gas producers. This is also the first large-scale offshore field development to incorporate the big bore concept, featuring industry advances in equipment design and manufacture. Implementation of significant design and operational enhancements has dramatically reduced drilling time and cost over the past six years without compromising safety or integrity.

The wells feature a tapered tubing design known as the "Optimized Big Bore" (OBB). The poster presentation highlights the challenges of planning and executing these OBB wells. It depicts the evolution of the OBB well design, critical equipment manufacture and testing, North Field drilling challenges, execution enhancements, and results obtained in recent years.

Introduction

Discovered in 1971, the North Field of Qatar is the world's largest non-associated gas field, extending over 6,000 km^2, and containing approximately 900 Tcf of sour, abnormally pressured natural gas. Production is from the massive Khuff carbonate formation, which includes several productive intervals situated at approximately 10,000 ft TVD. Well deliverability from the reservoirs is very high due to both formation quality, near initial reservoir pressure, and high net pay thickness. Recent growth in global LNG demand has accelerated development of the North Field and positioned Qatar to become the world's largest LNG producer. RasGas is responsible for the development of a large concession area, covering more than 500 Km^2 (**Fig. 1**) and requires a large number of wells to be drilled in the period 2002 to 2010 to supply growth in both the Qatar LNG export and domestic gas markets.

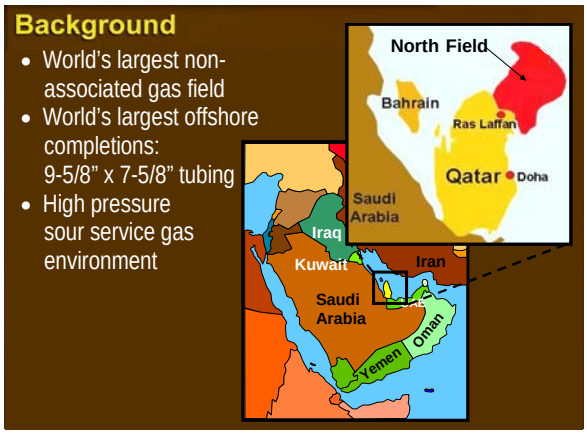

Fig. 1: North Field Overview

Design Objectives & Design Evolution

In the 1990's, well designs had evolved from packer / tubing completions intended to produce at 60 MMscfd to high-rate 7-in. monobore wells able to deliver in excess of 100 MMscfd[1]. However, it was recognized by RasGas and its major shareholders Qatar Petroleum and ExxonMobil that higher capacity well designs were feasible and would be advantageous for the RasGas expansion project. FEED (front-end engineering design) work to finalize the well design resulted in the selection of the OBB concept, featuring a tapered 9-5/8 x 7-5/8-in. tubing x 7-in. liner and tapered 13-3/8 x 9-5/8-in.